

TEC-604

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Even Semester Examination 2017-18

B.TECH. (SEMESTER-VI)

DIGITAL COMMUNICATION

Time: 03:00 Hours

Max Marks : 100

Note: Attempt all questions. All question carry equal marks. In case of misprinting assume suitable data

Q1- Attempt any four of the following:

(4X5 =20)

- Draw the block diagram of digital communication and discuss advantage of digital communication over analog communication.
- What do you understand with ISI? Discuss Nyquist criterion for zero ISI by pulse shaping.
- Write and explain the laws of convolution relationship.
- Differentiate Sourced coding from the Channel coding.
- Given the data stream 1110010101. Sketch the transmitted sequence of Pulses for each of the following line codes:

(i) Unipolar RZ and NRZ.

(ii) Polar RZ and NRZ.

Q2- Attempt any four of the following:

(4X5 =20)

- Discuss the matched filter and prove any one property?
- Using suitable waveform, make a comparison between ASK, FSK and PSK.
- Explain the construction of Block Code.

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(1)

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- (d) In a DM system, the voice signal is sampled at a rate of 64000 samples/ sec. The max sample amplitude $A_{max} = 1$. Determine quantization noise power if voice signal bandwidth is 3.5 KHz.
- (e) For the following data stream, show the phase status of carrier and draw QPSK
Signal Data Stream = 10110001

Q3- Attempt any two of the following:- (2X10 =20)

- (a) What is Entropy? Consider a binary memory less source X with two symbols X_1 and X_2 . Show that $H(x)$ is maximum when both X_1 and X_2 are equiprobable.
- (b) A TV signal has a bandwidth of 4.5 MHz. This signal is sampled, quantized and binary coded to obtain a PCM signal. Determine:
- Sampling rate if the signal is to be sampled at a rate of 20% above the Nyquist rate
 - The number of binary pulses required to encode each sample, samples are quantized into 1024 levels.
 - The binary pulse rate of binary coded signal, and the minimum bandwidth required to transmit the signal
- (c) Apply the Huffman coding procedure for the following message ensemble

$$[X] = [x_1 x_2 x_3 x_4 x_5 x_6 x_7]$$

$$[P] = [0.4 \ 0.2 \ 0.12 \ 0.08 \ 0.08 \ 0.08 \ 0.04 \]$$

- Take $n=2$
- Take $n=3$

Q4- Attempt any two of the following: (2X10 =20)

- (a) What are the types of digital modulation techniques? What do you mean by Coherent binary modulation technique? Explain the Coherent binary ASK or On-Off keying.

- (b) Differentiate between the characteristics of ASK, PSK and FSK. Which one is the best? Explain.
- (c) Explain the following:
 - (i) Correlation detector
 - (ii) Convolution Code

Q5- Attempt any two of the following:- (2X10 =20)

- (a) What do you mean by matched filter in digital communication? Calculate the probability of error for matched filter.
- (b) With the help of suitable example explain cyclic code and Block code.
- (c) Write short notes on:
 - (i) Entropy
 - (ii) QPSK
 - (iii) Parity Coding

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